NOVEMBER/DECEMBER 2024

CEL31 — PHYSICS OF MATERIALS

Time : Three hours Maximum : 75 marks

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SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What is crystal?
2. Define unit cell.
3. State Bragg's law.
4. What is X-ray diffraction?
5. Give the details of Fermi energy level.
6. Define mean free path.
7. What are semiconductors?
8. Delineate hole.
9. What is drift velocity?
10. Write the expression for Hall coefficient.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Write a short note on hydrogen bonding.

Or

(b) What are Miller indices? Write the procedure for finding Miller indices of a given plane.

12. (a) State and explain Laue's equation.

Or

(b) Briefly explain the reciprocal lattice.

13. (a) State and explain Widemann-Franz law.

Or

(b) Write a short note on density of states.

14. (a) Classify the solids based on band theory.

Or

(b) Differentiate p- type and n-type semiconductors.

15. (a) Elucidate the mobile and immobile charges.

Or

(b) List out the applications of Hall effect.

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SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain the crystal classification into 7 systems and 14 Bravais lattices.

17. Explain the experimental method of X-rays diffraction study using powder photographic method.

18. Describe the Drude-Lorentz free electron theory of metals.

19. Describe the Kronig-Penney model. Using this model, show that the energy spectrum of electron consists of a number of allowed energy bands separated by forbidden regions.

20. Describe the experimental method for the determination of Hall voltage on the basis of the theory of Hall effect.

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